SCHOOL OF COMPUTATION, INFORMATION AND TECHNOLOGY — INFORMATICS

TECHNISCHE UNIVERSITÄT MÜNCHEN

Bachelor's Thesis, Master's Thesis, . . . in Informatics

Evaluating learning algorithms: An efficient way/Efficient ways to find Regular Inductive Statements

Author

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Titel der Abschlussarbeit

Author:	Author
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I confirm that this bachelor's thesis, master's thesis, . . . is my own work and I have documented all sources and material used.

Munich, Submission date   Author

Abstract

Acknowledgments

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1 Introduction

As software systems grow in size and permeate more and more areas of our lives. Individuals and organizations use the majority of software in their systems. Thus the reliability and stability of the software testing are of major importance. Simulation and testing can detect bugs but not prove their absence. Such reactive systems, when no function is being computed, termination is usually undesirable. For this reason, we are interested in *property checking* or *model checking*.

Model checking is a powerful technique for automatic verification of finite state concurrent systems [CES09]. In this thesis, we only focus on *regular model checking*, which is a important framework for infinite state model-checking. The model is typically a regular transition system. It describes the potential behavior of discrete systems by representing it in finite state automaton. In [CES09] the author introduce an approach, that using the inductive statements for the regular transition for checking safety conditions. "Statement ψ is inductive if the transition relation only relates a state ν satisfying ψ with states that also satisfy ψ. Thus, the set of all states that satisfy ψ over-approximates the set of all states reachable from ν".

Based on automata learning, one can learn a set of inductive statements that are powerful enough to establish a given safety property. The learned language of inductive statements is a certificate of the correctness of the property. The purpose of this thesis is to collect and analyze empirical data on the performance of the learning algorithms such as L*, NL*, Kearns-Vazirani, Rivest-Schapire.

Structure of the thesis

In the first part of our thesis, we consider the regular transition system and the set of all inductive statements. In the second part of the thesis,

2 Literature Review

Motivated from paper Inductive statements for regular transition system. He used only the L* algorithm for learning the regular statements.

3 Regular Transition System and Inductive Statements

4 Learning Algorithms

5 Implementation

6 Conclusion

Abbreviations

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Bibliography

[CES09] E. M. Clarke, E. A. Emerson, and J. Sifakis. "Model checking: algorithmic verification and debugging." In: *Communications of the ACM* 52.11 (2009), pp. 74–84.